

TAKAHASHI *et al.*, 09/811,606
Amdt. dated 19 October 2004
Reply to *ex parte* Quayle OA of 7 September 2004

520.39871X00/NT0318US1
Page 2

IN THE CLAIMS:

1. (Previously Presented) A magnetoresistive sensor including a substrate, a pair of magnetic shield layers consisting of a lower magnetic shield layer and an upper magnetic shield layer, a magnetoresistive sensor layer disposed between the pair of magnetic shields, an electrode terminal for flowing a signal current perpendicular to the plane of the magnetoresistive sensor layer, and magnetic domain control layers for controlling Barkhausen noise of said magnetoresistive sensor layer, wherein said magnetic domain control layers disposed on opposite ends of the magnetoresistive sensor layer in a region from the end surface of a media-opposed surface side of the magnetoresistive sensor layer to the depth position are made of a material having a specific resistance not less than 10 mΩcm, and are in contact with at least opposite end surfaces of said magnetoresistive sensor layer in said region;

wherein each magnetic domain control layer of said magnetic domain control layers includes regions of hard magnetic material having high coercivity made of a metal magnetic material having a composition including at least one of the elements of Co (cobalt), Cr (chromium), Pt (platinum), Ta (tantalum), and Nb (niobium), and regions of insulating material made of at least one of Al₂O₃, SiO₂, HfO₂, TaO₂, TiO₂, Ta₂O₅, AlN, AlSiN, or ZrO₂, said each magnetic domain control layer including at least two of the regions of hard magnetic material which are separated from one another.

TAKAHASHI *et al.*, 09/811,606
Amdt. dated 19 October 2004
Reply to *ex parte* Quayle OA of 7 September 2004

520.39871X00/NT0318US1
Page 3

2.-20. (Cancelled)

21. (Previously Presented) A magnetoresistive sensor including a substrate, a pair of magnetic shield layers consisting of a lower magnetic shield layer and an upper magnetic shield layer, a magnetoresistive sensor layer disposed between the pair of magnetic shields, an electrode terminal for flowing a signal current perpendicular to the plane of the magnetoresistive sensor layer, and magnetic domain control layers, wherein a magnetic domain control layer of said magnetic domain control layers is disposed on each of two opposite ends of the magnetoresistive sensor layer in the region from the end surface of the media-opposed surface side of the magnetoresistive sensor layer to the depth position, wherein each said magnetic domain control layer includes regions of a hard magnetic material having high coercivity made of a metal magnetic material having a composition including at least one of the elements of Co (cobalt), Cr (chromium), Pt (platinum), Ta (tantalum), and Nb (niobium), and regions of an insulating material made of at least one of Al₂O₃, SiO₂, HfO₂, TaO₂, TiO₂, Ta₂O₅, AlN, AlSiN, or ZrO₂, each said magnetic domain control layer including at least two of the regions of hard magnetic material which are separated from one another.

22.-25. (Cancelled)

26. (Currently Amended) A magnetoresistive sensor comprising:
a magnetoresistive sensor layer; and

TAKAHASHI *et al.*, 09/811,606
Amdt. dated 19 October 2004
Reply to *ex parte* Quayle OA of 7 September 2004

520.39871X00/NT0318US1
Page 4

a magnetic domain control layer on each of two opposite end surfaces of said magnetoresistive layer, each magnetic domain control layer in contact with end surfaces of said magnetoresistive layer and having a specific resistance of not less than $10\text{m}\Omega\text{cm}$, and including regions made of a hard metal magnetic material having a composition including at least one of the elements of Co (cobalt), Cr (chromium), Pt (platinum), Ta (tantalum), and Ni (niobium), said each magnetic domain control layer including at least two of the regions of hard magnetic material which are separated from one another.

27. (Previously Presented) The magnetoresistive sensor according to claim 1, wherein the material consisting of said magnetic domain control layer is a granular layer.

28. (Previously Presented) The magnetoresistive sensor according to claim 21, wherein the material consisting of said magnetic domain control layer is a granular layer.

29. and 30. (Cancelled)

31. (Previously Presented) The magnetoresistive sensor according to claim 26, wherein the magnetic domain control layer is a granular layer.

32. and 33. (Cancelled)